

## RADAR OBSERVATIONS OF ASTEROID 10115 (1992 SK)

L. A. M. Benner, S. J. Ostro, J. D. Giorgini, R. F. Jurgens, R. Rose, M. L. Thomas, R. Winkler, D. Choate, R. Frye, C. R. Franck, D. K. Yeomans, M. A. Slade (JPL/Caltech), and R. S. Hudson (Washington State U.).

The approach of 1992 SK to within 0.056 AU of Earth on 1999 March 26 provided an excellent opportunity for **radar** observations. We observed it daily between March 22-26 at Goldstone at a transmitter frequency of 8560 MHz (3.50 cm). Weighted, optimally smoothed sums of cw (Doppler-only) echoes achieve a signal-to-noise ratio of about 300. Our highest resolution cw setup places up to ~30 0.5-Hz Doppler cells on the target at echo powers exceeding two standard deviations of the noise. Our highest resolution imaging setup places about 20 0.25-us (37.5 m) x 2.0-Hz pixels on 1992 SK at echo powers above the same threshold. We completed nearly 300 runs with each setup and obtained thorough rotational phase coverage (period = 7.320 h, P. Pravec, pers. comm.). The dispersion of the echoes in time delay indicates a lower bound on 1992 SK's maximum pole-on breadth of ~0.4 km that is consistent with the echo bandwidth and rotation period. Variations in the cw spectral bandwidths and shapes and in the delay-Doppler images as a function of rotation phase are evident on each day, are consistent in bandwidth with each other and with the rotation period, and indicate that the asteroid is asymmetric and modestly elongated.

The following table presents some of our astrometric results. Each entry gives the time delay or Doppler frequency for echoes from the target's center of mass received at the specified UTC epoch. Stated errors incorporate uncertainties in the asteroid's dimensions. DSS-14 was used for transmitting and receiving. The 70-m antenna's reference point is the intersection of the elevation and azimuthal axes. Here 1 us corresponds to 150 m in range and 1 Hz corresponds to 1.75 cm/s in radial velocity.

UTC Epoch		Type	Measurement	+/-
yyyy/mm/dd	hh:mm:ss			
1999/03/22	19:00:00	Doppler	256120.928 Hz	2.0 Hz
1999/03/22	20:20:00	Delay	60.196743 s	15.0 us
1999/03/23	17:20:00	Doppler	200657.153 Hz	1.5 Hz
1999/03/23	18:00:00	Delay	58.222201 s	13.0 us
1999/03/24	19:20:00	Delay	56.606774 s	10.0 us
1999/03/24	19:50:00	Delay	56.581684 s	6.0 us
1999/03/24	20:40:00	Delay	56.5413515 s	3.0 us
1999/03/25	20:00:00	Delay	55.8392945 s	3.0 us